



ENU 4605 | Radiation Interactions and Sources 1

Class Number: 27089

Instructor Information

Name: Ira Harkness

Course Details

Catalog Description: Three one-hour lectures discussing interaction of ionizing radiation with matter; cross sections and radiation fields with emphasis on photons, heavy charged particles and electrons.

Pre- and Co-Requisites: Prereq: PHY 2049.

Credit Hours: 4

Course Fees: \$0.00

Required Materials

ATOMS, RADIATION, AND RADIATION PROTECTION

ISBN: 9783527406067

Authors: JAMES E. TURNER

Publisher: JOHN WILEY

Edition: 3RD

Course Goals and Objectives

- Students will learn detailed information about nuclear structure the essentials of modern physics. (HW 1, Exam 1)
- Students will learn radioactive decay and series decay. (HW 2-3, Exam 1, Final Exam)
- Students will develop a qualitative and quantitative understanding of photon interactions (HW 4, Exam 2, Final Exam)
- Students will develop a qualitative and quantitative understanding of charged particle interactions (HW 5, Exam 2, Final Exam)

- Students will develop a qualitative and quantitative understanding of neutron interactions (HW 6, Exam 2, Final Exam)
- Students will develop a qualitative understanding of radiation dosimetry and radiation protection (Exam 2)

Expectations and Student Learning Outcomes

Relation to Program Outcomes (ABET)

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics (medium coverage)
2. An ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare as well as global, cultural, social, environmental, and economic factors (low coverage)
3. n/a
4. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts (low coverage)
5. n/a
6. n/a
7. n/a

Methods of Evaluation

Assessments in this course are worth a total of 1000 points broken down as follows:

- (6) Homework Assignments -- 250 points (50 each; lowest HW dropped automatically)
- (2) During Term Exams -- 500 points (250 each)
- (1) Final Exam -- 250 points

Grading Scale

Grades will be assigned based on the following scale:

A: 900+ points

A-: 860 - 899 points

B+: 820 - 859 points

B: 780 - 819 points

B-: 740 - 779 points

C+: 700 - 739 points

C: 660 - 699 points

E: < 660 points

Course Schedule

Week 1: Syllabus Review; Chemistry/Physics Refresher

Week 2: Modern Physics

Week 3: Atomic and Nuclear Structure and Radiation

Week 4: Radioactive Decay

Week 5: Series Decay and Equilibrium

Week 6: Exam 1 Review and Exam 1

Week 7: Photon Interactions

Week 8: Photon Interactions

Week 9: Charged Particle Interactions

Week 10: Charged Particle Interactions

Week 11: Exam 2 Review and Exam 2

Week 12: Neutron Interactions

Week 13: Neutron Interactions

Week 14: Dosimetry and Radiation Protection

Week 15: Final Exam Review

University Policies and Resources

Information about grading policies, support for students with disabilities, course evaluations, the Honor Code, and other course policies and campus resources can be found on the [Syllabus Policies page](#).

Attendance Policy

Excused and Unexcused Absences

Students may only participate in classes if they are registered officially or approved to audit with evidence of having paid audit fees. The Office of the University Registrar provides official class rolls to instructors.

Students are responsible for satisfying all academic objectives as defined by the instructor. Absences count from the first-class meeting.

Acceptable reasons for absence from or failure to engage in class include illness; Title IX-related situations; serious accidents or emergencies affecting the student, their roommates, or their family; special curricular requirements (e.g., judging trips, field trips, professional conferences); military obligation; severe weather conditions that prevent class participation; religious holidays; participation in official university activities (e.g., music performances, athletic competition, debate); and court-imposed legal obligations (e.g., jury duty or subpoena). Other reasons (e.g., a job interview or club activity) may be deemed acceptable if approved by the instructor.

For all planned absences, a student in a situation that allows an excused absence from a class, or any required class activity must inform the instructor as early as possible prior to the class. For all unplanned absences because of accidents or emergency situations, students should contact their instructor as soon as conditions permit.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during absence from class or inability to engage in class activities because of the reasons outlined above.

If a student does not participate in at least one of the first two class meetings of a course or laboratory in which they are registered, and they have not contacted the department to indicate their intent, the student can be dropped from the course. Students must not assume that they will be dropped, however. The department will notify students if they have been dropped from a course or laboratory.

The university recognizes the right of the instructor to make attendance mandatory and require documentation for absences (except for religious holidays), missed work, or inability to fully engage in class. After due warning, an instructor can prohibit further attendance and subsequently assign a failing grade for excessive absences.

Religious Holidays Guidelines

At the University of Florida, students and faculty work together to allow students the opportunity to observe the holy days of their faith. A student should inform the faculty member of the religious observances of their faith that will conflict with class attendance, with tests or examinations, or with other class activities prior to the class or occurrence of that test or activity. The faculty member is then obligated to accommodate that particular student's religious observances. Because students represent a myriad of cultures and many faiths, the University of Florida is not able to assure that scheduled academic activities do not conflict with the holy days of all religious groups. Accordingly, individual students should make their need for an excused absence known in advance of the scheduled activities.

The Florida Board of Education and state law govern university policy regarding observance of religious holidays.

Guidelines

- Students, upon prior notification to their instructors, shall be excused from class or other scheduled academic activity to observe a religious holy day of their faith.
- Students shall be permitted a reasonable amount of time to make up the material or activities covered in their absence.
- Students shall not be penalized due to absence from class or other scheduled academic activity because of religious observances.

If a faculty member is informed of or is aware that a significant number of students are likely to be absent from class because of a religious observance, the faculty member should not schedule a major exam or other academic event at that time.

A student who is to be excused from class for a religious observance is not required to provide a second party certification of the reason for the absence. Furthermore, a student who believes that they have been

unreasonably denied an education benefit due to religious beliefs or practices may seek redress through the student grievance procedure.

Absence due to Illness

A student who is absent from class or any required class-related activity because of illness should contact their instructor, if feasible, as early as possible prior to the missed class or activity.

Students shall be permitted a reasonable amount of time to make up the material or activities covered during an excused absence.

Students should contact their college by the deadline to drop a course for medical reasons. Students can petition the Dean of Students Office to drop a course for medical reasons. The university's policy regarding medical excuse from classes is maintained by the Student Health Care Center.

Twelve-Day Rule

Students who participate in university-sponsored athletic or scholarly activities are permitted to be absent 12 scholastic days per semester without penalty. A scholastic day is any day on which regular class work is scheduled as defined in the approved university calendar. [More Info](#)

The student or student's advisor must notify the instructor as early as possible prior to the anticipated absence to allow ample time for accommodations. Instructors must be flexible and not penalize students when re-scheduling during-term and final exams, class assignments, and other required activities and must follow the UF Attendance Policy herein and UF Examination Policies. As noted in the UF Examination Policies, during-term exams should be re-scheduled no later than before the end of the semester, while final exams no later than 90 days after the originally scheduled exam time. However, instructors are encouraged to re-schedule final and during-term exams, assignments, and other activities as soon as possible after the last day of the absence and must not penalize the student in any way. [More Info](#)

A group's schedule that requires absence of more than 12 scholastic days should be adjusted so that no student is absent from campus more than 12 scholastic days. Students who previously have been warned in

writing by their instructor about the impact of absences on their individual class performance should not incur additional absences, even if they have not been absent 12 scholastic days. The student is responsible to maintain satisfactory academic performance and attendance.

Late and Make Up Work Policy

- Assignments are due by 2359 on the specified date.
- A grace period until 0800 the following day is set for each assignment. Students may submit assignments within this grace period without penalty.
- After 0800 the following day, the assignment closes on Canvas and no submission are allowed, unless there is an approved excused absence.
- For excused absences, you must contact me via email as soon as conditions permit and provide a reason for your excused absence. I reserve the right to require documentation (except for religious holidays), consistent with university policy. Upon approval of an excused absence, I will modify the "open until" date in Canvas to allow you to make up the assignment.

Commitment to a Positive Learning Environment

The Herbert Wertheim College of Engineering values varied perspectives and lived experiences within our community and is committed to supporting the University's core values.

If you feel like your performance in class is being impacted, please contact your instructor or any of the following:

- Your academic advisor or Undergraduate Coordinator
- HWCOE Human Resources, 352-392-0904, student-support-hr@eng.ufl.edu
- Pam Dickrell, Associate Dean of Student Affairs, 352-392-2177, pld@ufl.edu